Amendments to the Specification

Col. 2, lines 21-47.

In accordance with one aspect of the present invention, there is provided a polythioether having the formula I

$$-R^1-[-S-(CH_2)_2-O-[-R^2-O-]_m-(CH_2)_2-S-R^1-]_n- \qquad I$$

wherein

R^1 denotes a divalent C_{2-6} n-alkylene, C_{3-6} branched alkylene, C_{6-8} cycloalkylene or C_{6-10} alkylcycloalkylene group, $-[(-CH_2-)_p-X-]_q-(-CH_2-)_r-$, or $-[(-CH_2-)_p-X-]_q-(-CH_2-)_r-$ in which at least one $-CH_2-$ unit is substituted with a methyl group,

R^2 denotes methylene, a divalent C_{2-6} n-alkylene, C_{2-6} branched alkylene, C_{6-8} cycloalkylene or C_{6-10} alkylcycloalkylene group, $-[(-CH_2)_p-X-]_q-(-CH_2-)_r-$, or $-[(-CH_2)_p-X-]_q-(-CH_2-)_r-$ in which at least one $-CH_2-$ unit is substituted with a methyl group, X denotes one selected from the group consisting of O, S and $-NR^6-$,

R^6 denotes H or methyl,

m is a rational number from 0 to 10,

n is an integer from 1 to 60,

p is an integer from 2 to 6,

q is an integer from 1 to 5, and

r is an integer from 2 to 10,

the polythioether being a liquid at room temperature and pressure.

Co. 2, lines 50-65

In a first preferred embodiment, the polythioether has the formula II

$$A-(-[R^3]_y-R^4)_2 \qquad II$$

wherein

A denotes a structure having the formula I,

y is 0 or 1,

R^3 denotes a single bond when y=0 and $-S-(CH_2)_2-[-O-R^2-]_m-O-$ when y=1,

R^4 denotes –SH or $-S-(-CH_2-)_2-O-R^5$ when y=0 and [[$-CH_2=CH_2$]] $-CH=CH_2$ or $-(CH_2-)_2-S-R^5$ when y=1,

R^5 denotes C_{1-6} n-alkyl which is unsubstituted or substituted with at least one –OH or –NHR^7 group, and

R^7 denotes H or a C_{1-6} n-alkyl group.

Col. 3, lines 25-43

In a second preferred embodiment, the polythioether has the formula III

$$[[A-(-[R^3]_y-R^4)_z]] \qquad A-(-[R^3]_y-R^4)_z \qquad III$$

wherein

A denotes a structure having the formula I,

y is 0 or 1,

R^3 denotes a single bond when y=0 and $-S-(CH_2)_2-[-O-R^2-]_m-O-$ when y=1,

R^4 denotes –SH or –S–(–CH_2–)$_2$–O–R^5 when y=0 and [[–CH_2=CH_2]] –CH=CH_2 or –(CH_2–)$_2$–S–R^5 when y=1,

R^5 denotes C_{1-6} n-alkyl which is unsubstituted or substituted with at least one –OH or –NHR^7 group, and

R^7 denotes H or a C_{1-6} n-alkyl group[[.]],

z is an integer from 3 to 6, and

B denotes a z-valent residue of a polyfunctionalizing agent.

Col. 5, lines 25-50

In their most general aspect, the inventive polythioethers include a structure having the formula I

$$-R^1-[-S-(CH_2)_2-O-[-R^2-O-]_m-(CH_2)_2-S-R^1-]_n- \quad \text{I}$$

wherein

R^1 denotes a divalent C_{2-6} n-alkylene, C_{3-6} branched alkylene, C_{6-8} cycloalkylene or C_{6-10} alkylcycloalkylene group, –[(–CH_2–)$_p$–X–]$_q$–(–CH_2–)$_r$–, or –[(–CH_2–)$_p$–X–]$_q$–(–CH_2–)$_r$– in which at least one –CH_2– unit is substituted with a methyl group,

R^2 denotes methylene, a divalent C_{2-6} n-alkylene, C_{2-6} branched alkylene, C_{6-8} cycloalkylene or C_{6-10} alkylcycloalkylene group, –[(–CH_2–)$_p$–X–]$_q$–(–CH_2–)$_r$–, or –[(–CH_2–)$_p$–X–]$_q$–(–CH_2–)$_r$– in which at least one –CH_2– unit is substituted with a methyl group,

X denotes one selected from the group consisting of O, S and –NR^6–,

R^6 denotes H or methyl,

m is a rational number from 0 to 10,

n is an integer from 1 to 60,

p is an integer from 2 to 6,

q is an integer from 1 to 5, and

r is an integer from 2 to 10.

Col 6, lines 40-55

A first preferred embodiment of the inventive polythioethers has the formula II

$$[[A-(-[R^3]-R^4)_2]] \qquad \underline{A-(-[R^3]_y-R^4)_2} \qquad \text{II}$$

wherein

A denotes a structure having the formula I,

y is 0 or 1,

R^3 denotes a single bond when y=0 and $-S-(CH_2)_2-[-O-R^2-]_m-O-$ when y=1,

R^4 denotes –SH or $-S-(-CH_2-)_2-O-R^5$ when y=0 and $[[-CH_2=CH_2]]$ $\underline{-CH=CH_2}$ or $-(CH_2-)_2-S-R^5$ when y=1,

R^5 denotes C_{1-6} n-alkyl which is unsubstituted or substituted with at least one –OH or $-NHR^7$ group, and

R^7 denotes H or a C_{1-6} n-alkyl group.

Col. 7, lines 4-7

In a more particular preferred embodiment of the foregoing polythioether, when m=1 and R^2 = n-butylene in formula II, R^1 is not ethylene or n-propylene. Also preferably, when m=1, p=2, q=2, r=2 and R^2 = ethylene, X is not O.

Col. 7, line 53 to col. 8, line 4.

Polyfunctional polythioethers according to the present invention thus preferably have the formula III

$$[[B-(-A-[R^3]-R^4)_z]] \qquad B-(-A-[R^3]_y-R^4)_z \qquad \text{III}$$

wherein

A denotes a structure having the formula I,

y is 0 or 1,

R^3 denotes a single bond when y=0 and $-S-(CH_2)_2-[-O-R^2-]_m-O-$ when y=1,

R^4 denotes –SH or $-S-(-CH_2-)_2-O-R^5$ when y=0 and $[[-CH_2=CH_2]]$ $-CH=CH_2$ or $-(CH_2-)_2-S-R^5$ when y=1,

R^5 denotes C_{1-6} n-alkyl which is unsubstituted or substituted with at least one –OH or –NHR^7 group,

R^7 denotes H or a C_{1-6} n-alkyl group,

z is an integer from 3 to 6, and

B denotes a z-valent residue of a polyfunctionalizing agent.

Col. 8, lines 63-67.

The compounds of formula IV are dithiol compounds. Preferred dithiols include those compounds in which R^1 is a divalent C_{2-6} n-alkylene group, i.e., 1,2-ethanedithiol, 1,3-propanedithiol, 1,4-butanedithiol, 1,5-pentanedithiol or 1,6-hexanedithiol.

Col 9, lines 1-10.

Additional preferred dithiols include those compounds in which R^1 is a divalent C_{3-6} branched alkylene group, having one or more pendent groups which can be, for example, methyl or ethyl groups. Preferred compounds having branched alkylene R^1 include 1,2-propanedithiol, 1,3-butanedithiol, 2,3-butanedithiol, 1,3-pentanedithiol, 1,3-dithio-3-methylbutane and 2,3-butanedithiol. Other useful dithiols include those in which R^1 is a divalent C_{6-8} cycloalkylene or C_{6-10} alkylcycloalkylene group, for example, dipentenedimercaptan and ethylcyclohexyldithiol (ECHDT).

Col. 9, lines 47-62.

Exemplary divinyl ethers include those compounds in which R^2 is C_{2-6} n-alkylene or C_{2-6} branched alkylene. Preferred divinyl ethers of this type include ethylene glycol divinyl ether (EG-DVE) (R^2=ethylene, m=1); butanediol divinyl ether (BD-DVE) (R^2=butylene, m=1); hexanediol divinyl ether (HD-DVE) (R^2=hexylene, m=1); diethylene glycol divinyl ether (DEG-DVE) (R^2=ethylene, m=2); triethylene glycol divinyl ether (R^2=ethylene, m=3); and tetraethylene glycol divinyl ether (R^2=ethylene, m=4). Useful divinyl ether blends include "PLURIOL®" type blends such as PLURIOL® E-200 divinyl ether (commercially available from BASF), for which R^2=ethylene and m=3.8, as well as "DPE" polymeric blends such as

DPE-2 and DPE-3 (commercially available from International Specialty Products, Wayne, N.J.). Of these, DEG-DVE and PLURIOL® E-200 are particularly preferred.

Col. 9, lines 63-67

Useful divinyl ethers in which R^2 is C_{2-6} branched alkylene can be prepared by reacting a polyhydroxy compound with acetylene. Exemplary compounds of this type include compounds in which R^2 is an alkyl-substituted methylene group such as $-CH_2(CH_3)-$ or $-CH_2CH(CH_3)-$.

Col. 10, lines 52-59

According to another preferred method, (n) equivalents of a compound having the formula [[!V]] IV, or a mixture of at least two different compounds having the formula IV, are reacted with (n+1) equivalents of a compound having the formula V, or a mixture of at least two different compounds having the formula V, again in the presence of an appropriate catalyst. This method affords an uncapped, vinyl-terminated difunctional polythioether.